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An analysis is presented of the handling of the human elements in fire safety. Emphasis is given to considerations such as how fires kill children, the school's responsibility for fire safety, causes of human failure, and the necessity for organized emergency programs and drills. Also included is a check list of items concerned with protection from fire hazard in a schoolhouse. (FS)

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Ring the Alarm!

A Memo to the Schools on Fire and Human Beings

Some Suggestions
for Principals and Other
School Officials on the
Management of People to
Meet the Emergency
of School Fires

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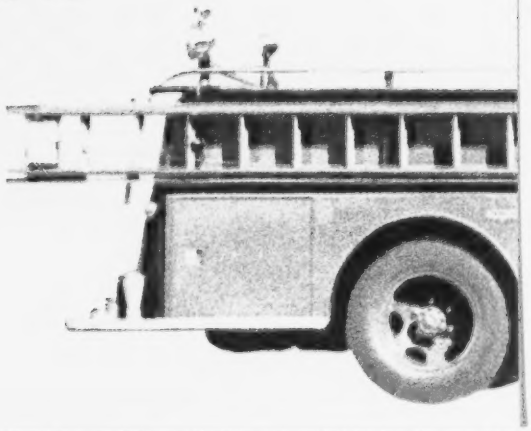
NOTE

This booklet is intended to assist principals, superintendents, and other school officials in the handling of the human elements of fire safety. It is not a handbook on how to create fire-safe school buildings.

A definitive report on schools and their relation to fire will be forthcoming later this year when the Building Research Advisory Board, of the National Academy of Sciences–National Research Council, completes an extensive study now under way with the cooperation of:

American Association of School Administrators; American Institute of Architects; American Municipal Association; American Society of Civil Engineers; Associated General Contractors of America; Association of School Business Officials of the United States and Canada; Building Officials Conference of America; International Association of Fire Chiefs; International Conference of Building Officials; National Board of Fire Underwriters; National Bureau of Standards; National Council of Independent Schools, Inc.; National Council on Schoolhouse Construction; National Education Association; National Fire Protection Association; National Safety Council; National School Boards Association; The Producers Council, Inc.; Southern Building Code Congress; United States Chamber of Commerce; and The United States Office of Education.



EACH DAY WE Americans place millions of our school children in buildings that can and all too often do catch fire.

Over the last 50 years, an average of 18 children, teachers, and firemen have died by fire each year in our schools and colleges. Over the past 5 years we have averaged about 12 major school fires a day with an average daily property loss of $73,000.

In 1958 there were 4,000 reported school fires with a total property loss of $23,981,000. In just one fire, the Chicago disaster at Our Lady of the Angels School, 93 children and teachers died. Seventy-seven more were seriously injured. Two of the injured children recently died, bringing the total loss of life to 95.

No one intends that these fires should happen or these lives be lost. Yet schools do burn and children do die. And, almost without exception, the deaths occur because of human fallibility, human omission, and human error.

In a recent study of 300 school fires, the National Fire Protection Association estimated that more than 30 per cent of the fires were directly attributable to human negligence or maliciousness. Smoking caused 12 per cent. Children with matches accounted for 1 per cent. Spontaneous ignition from ill-kept rags and mops caused 5 per cent. Vandalism or deliberate incendiarism accounted for 12 per cent.

By far the most frequent source of fire was electricity. Over a third of the total number of fires in the study could be traced to electrical defects, such as overloading, short-circuiting, and defective equipment. Another 18 per cent resulted from poorly installed or defective heating or cooking

equipment. These fires, according to National Fire Protection Association officials, could logically be traced to human fallibility, i.e., poor maintenance, lack of repairs, the failure to rewire buildings to meet increased electrical loads, and replacement of blown fuses with fuses of higher capacity.

Of these same 300 fires, the National Fire Protection Association found that by far the largest number—55—had started in classrooms and laboratories, presumably started by children with matches, smoking, and vandalism, as well as electrical defects. The careless handling of chemicals in laboratories (sometimes encouraged by a lack of proper storage) often results in fires. Students and even chemistry teachers occasionally attempt to wash sodium down a sink drain. The potential danger of classroom fires will mount with increased attention to the teaching of science at all grade levels. Added vigilance must be exercised, therefore, to diminish this calculated but necessary risk.

Second only to classroom fires were those in unused areas where 41 fires began. Forty of these started in attics, and the National Fire Protection Association theorizes that some of them were due to children smoking surreptitiously. Since only two reported fires started in lavatories, this venerable spot for smoking is either passing into student disfavor or, more likely, the noncombustible nature of modern lavatories confined the fire, and its report, to the wastebasket.

Poor custodial services, the accumulation of rubbish within the school, and improper storage of equipment, combustible furniture, extra books and supplies, particularly under stairways and in attics, contribute to the danger from fire by providing fuel. Shoddy housekeeping invites disaster.

The extent of danger is indicated by the United States Office of Education's estimate that, as of 1953 (the last year of national inventory in this matter), some 3,400,000 children were housed in unsafe school buildings. An additional 3,000,000 were attending school in potentially dangerous buildings. This was in only 42 of the now 50 states.

How Fires Kill Children

Most children who die in school fires do so from asphyxiation by smoke and toxic gases. Others are scorched to their death by heat. A few actually die from the touch of flame.

But all children who die in school fires are killed because they are there—because they are in a building that is full of smoke, heat, and flame. The best, perhaps the only, way to be certain that children do not die is to make sure that there are no children in a burning building. This means *ring the alarm and get everyone out.*

This may seem a simple matter, but it is not. The National Fire Protection Association has reported that in the Chicago fire of 1958 approximately 12 minutes elapsed between the discovery of smoke and the ringing of the school alarm. If so, many of those 95 children and teachers would be alive today if the alarm had sounded within a minute after the discovery of smoke.

There is no time to spare for human error and miscalculation.

In Los Angeles in 1959, the local fire department and various educational and fire protection organizations conducted a series of test fires

in an abandoned Los Angeles school. The three-story building was not an obvious fire trap. It was built in 1925 and had brick exterior walls and concrete framing. The only wood used was in the roof and in the floors of the classrooms.

The tests were run under close-to-normal school conditions. There was no sprinkler system. Fire doors were left open. The fires were started, however, with about one third of the fuel that would normally be available in the average classroom.

What astounded the veteran fire experts during the tests was the incredibly short time it took for smoke to render the atmosphere deadly. It took only two minutes for a basement fire to fill the first floor of the building with lethal smoke. The same was true for first floor classroom fires. Within six minutes all the corridors in the building were impassable.

Even when automatic heat sensitive devices were used for closing the fire doors, the tests showed that smoke made the building uninhabitable before the heat of the fire brought the devices into operation. In short, there is SO LITTLE TIME!

The Inescapable Responsibilities

Parents have a right to expect their children to be kept safe from death by fire while the children are in school. The school system has the duty to keep the children safe.

It is a simple matter to say that a school system must at every moment be sensitive to the dangers of fire, that there must be a plan of action set

up throughout all the schools to protect the children, that the plan must be designed to lessen the possibility of human error.

The problem is that too many schools are not safe and that children still die in school fires. There is a mysterious gap between what school people know should be done and what actually is done. Why?

Some Causes of Human Failure

The greatest danger to the lives of school children may not come from simple negligence, or from carelessness in safety routines, or from overcrowding. It may come from excessive attention to matters other than fire safety. Whatever the cause may be, somewhere in the pursuit of education the basic safety of the children gets forgotten. No one means it to happen, but it does.

There is also great danger in the illusion of everlasting normalcy—the assumption that things are all right because there have been no fires in the school yet. Such is not the case. According to Henry G. Thomas, a retired fire chief and the president of the National Fire Protection Association, "The Chicago school fire could be duplicated in almost every American city."

Another danger lies in the mistaken assumption that people will do the right thing in an emergency.

In Asheville, North Carolina, in 1917, seven children were allowed to re-enter a burning school building in order to retrieve their coats. They all died. In Caraway, Arkansas, in 1928, the superintendent and a pupil re-

entered a school fire in order to save belongings. Both died. Proper training could have prevented these deaths.

Although human beings in a crisis want to save their lives, an emergency does not allow the time needed to see all relevant dangers and all avenues of escape, and to order the fitting action. In extreme situations even properly prepared people can panic. Although smoke, heat, and flame may do the actual killing, fire reports show that panic has been a major factor in many school fire deaths.

Most people, when suddenly confronted with a threat to their lives, stop momentarily. During this moment they are attempting to define the extent of the danger and to assess the possibilities of escape.

When the threat has been defined as fire, there will be a succeeding instant of fear and the simple urge to flee. This momentary fear is not necessarily bad. It can lead to useful or destructive action. At least it alerts the entire sensory system and makes swift action possible.

According to the best available research, if the human beings involved in a crisis have been carefully trained and if they know there is a means of escape even if it is not immediately visible, most of them will snap out of their momentary confusion and take proper action.

But if those involved in the emergency are forced to fumble for a solution to the threat, then the first panicky reaction may well spread contagiously throughout the group and mass panic may ensue.

The Necessity for Organized Response

Fire can come to any school, anywhere, at any time, no matter how safe

the building appears to be, no matter how elaborate the protective system is. Even in a fireproof school the contents are combustible.

Every school can considerably diminish the dangers of fire by establishing a practical plan of action. This plan must be designed to protect the school and its children with dispatch and a minimum of fuss and flurry. *Don't rely on inventiveness during the crisis.* Response should be automatic.

Keeping a Safe House

It is always easy to stack extra desks under the stairs or to store rubbish in the basement. Fires applaud principals and custodians addicted to this form of housekeeping.

Custodians should be required to make an inspection of the building each morning before school opens. Some schools require the custodian to have a check list to make sure that all dangerous places have been examined and all dangerous practices avoided. The principal should then make a daily spot-check to be certain that fire doors are not wedged open, outer doors are not locked, and panic bars are not chained.

In some schools, responsible students are formed into trained inspection teams to make weekly tours of the building in search of danger spots, bad housekeeping, and defective equipment. In Los Angeles, every school must have an *adult* fire safety committee.

The Human Element

Even the most impeccable system of fire safety will fail to prevent fire and death unless it is operated efficiently by the human beings in the school.

This means that everyone—the principal, the teachers, and the children—must have a lucid vision of his job in the event of fire. Thoroughly trained people are less likely to panic, less likely to do the inappropriate thing, less likely to increase the chances of loss of life.

If, as the Los Angeles fire tests indicate, a three-story building can become uninhabitable in only two minutes, then no school system can afford to take the slightest chance of leaving anyone in a school a moment longer than necessary.

If there is a fire, even in a classroom wastebasket, or a suspicion of fire through the sudden appearance or smell of smoke, then the school alarm should be rung immediately and the building evacuated.

This does not mean that a tipped-over Bunsen burner should be left to burn down the school. What it means is that the first purpose of fire safety is to save lives, not buildings.

In order to train people properly, some schools have made a point of having teachers join with principals and the superintendent in working out safety procedures. A group of teachers in Hartford, Connecticut, made a film on the subject, which was then shown to other teachers in the school system. People who have helped create a set of rules will re-

spond more intelligently and efficiently than people who have had the rules foisted upon them.

The Drill

Everyone must be taught where the alarm is and how to ring it—even down to such details as how to break the glass with the heel of a lady's shoe. Adults in the school must know if the local fire department is automatically alerted by the school alarm system. If not, they should know how the fire department can be notified by telephone or by the ringing of the nearest alarm box. And they should know where the nearest alarm box is located.

The school alarm sets in motion a carefully rehearsed evacuation procedure. It is the practice fire exit drill which enables the occupants of a building to leave it quickly and without panic in a genuine emergency.

Fire exit drills must be held frequently—at least once a month, even in winter. Since fire is no respecter of school schedules, drills should be held at all times of the day, including during changes of classes, assemblies, and lunch period. Special fire exit drills should be worked out for vacating school buses.

Drills should be held with unexpectedly blocked exits and corridors and with the forced use of alternate escape routes. The knowledge that alternate avenues to safety are available will considerably reduce the possibility of panic.

Drills should also be conducted when the principal is theoretically absent or incapacitated and deputies must take over.

Some schools include measures for handling people who have been theoretically disabled or injured (by an explosion, for instance, followed by fire). Selected teachers are formed into a disaster and first aid team.

Fire drills can give a false sense of security if they are run with advance warning or are carried out too rigidly and militaristically. Drills judged solely by the stop watch can induce complacency. Flexibility and surprise are of the utmost importance.

The Perils Outside and Afterwards

The dangers do not disappear after the building is vacated. Students milling aimlessly outside a burning school have often hampered fire fighting. So have frantic parents who besieged the sites of burning buildings, seeking information about the safety of their children.

Part of the drill procedure should be the swift marching of children away from the danger area, the taking of an immediate roll call by each teacher, and the rapid reporting of any missing children. The orderly accounting for children outside the building will diminish the possibility of panic among parents.

The drill procedures should include plans for appropriate safe places to which the children can be taken while the fire is being fought if they cannot be sent directly home.

IN SUM

- Any school, including yours, can have a fire. Considering the fact that there are some 43,000,000 students enrolled in American schools and colleges, 18 lives lost per year sounds statistically small, except that it is 18 too many.
- Your school should be surveyed to detect the danger spots that must be checked regularly.
- Shoddy housekeeping invites disaster.
- Contrary to popular belief, more fires start in classrooms than in any other space in the school, including storerooms.
- Smoke and toxic gases, not heat and flame, are the great first dangers. A three-story building can become uninhabitable in two minutes. Time is of the essence.
- Fire exit drills, however beautifully organized and executed, may be ineffectual in times of real danger if there is no effective plan for getting the alarm rung in the first place.
- And, a last word, RING THE ALARM!

A Check List for School Officials

1. Has the building been surveyed for fire hazard by a team of informed persons—school officials, local fire safety officials, and other fire experts as may be required—to determine beforehand the most likely sources of danger? Are these danger spots known to all and kept under special scrutiny? Is there continuous communication and cooperation with the local fire department?
2. Is the entire school, including teachers, custodial staff, and students, organized so that every person in the school has a clear idea of what he should do in case of an emergency or a fire exit drill?
3. Does every teacher know where the nearest school alarm is and how to ring it? Does every custodian know?
4. Are there specified adults in the building who know where the fire-fighting equipment is, how to use it, when to use it, and when not to use it?
5. If the school alarm is not automatically tied in to the local fire department, is there a clearly worked out system for notifying the department *the instant* the school alarm rings? Are teachers and custodians aware of the system and aware of their own responsibilities in this connection? Are people trained to fill the gap if any link in communication is broken?
6. Does every position of authority in the chain of command, from the principal on down, have a substitute to fill in if the position is unoccupied in an emergency?
7. Did teachers, custodians, and maintenance men help draw up the fire safety procedures?
8. Is there an unannounced fire drill at least once a month? During change of classes? Assemblies? Lunch period? On school buses?

9. Are exits and corridors regularly blocked during drills and alternate escape routes worked out?
10. Are drills conducted when the principal is theoretically absent? When people have been theoretically disabled?
11. Is there a daily fire safety inspection by custodians checked by the principal?
12. Are all possibly dangerous or combustible materials always stored in a protected place and never stored under stairs or in stairwells?
13. Is fire safety included in the curriculum? Are students used to help out in fire inspections?
14. Are children taken immediately away from the building and is a roll call taken? Is there a safe place, thought out beforehand, for them to go to if the emergency is real and prolonged?

Preparation of the Report

Protection from fire hazard in a schoolhouse is not an exact science. Basic knowledge is derived from the experience and observation of a relatively small number of persons who study the matter in depth. There is not always agreement in detail. Almost no generalization about fire safety will always and exactly fit every particular building. Many decisions can only be made building by building if they are to be realistic.

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